



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,022	01/29/2004	Yoji Nakatani	501.43385X00	2664

24956 7590 03/21/2006

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER

DILLER, JESSE DAVID

ART UNIT	PAPER NUMBER
----------	--------------

2187

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/766,022	Applicant(s) NAKATANI ET AL.	
	Examiner Jesse Diller	Art Unit 2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-5, 7-10, 12-15 is/are allowed.
- 6) ☒ Claim(s) 1, 6, 11, 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

1. Examiner acknowledges receipt of the amendment in response to the office action dated 08/03/2005, which amendment was received 12/05/2005. At this point, claims 1-2, 6-7, 11-12, and 15 have been amended, and claim 16 have been added. Thus, claims 1-16 are now pending in the application.

Objections to the disclosure

2. In response to Applicant's comments, the objection to the abstract is withdrawn.

Claim Rejections – 35 USC § 112 and 102

3. In response to amendment, the 35 USC § 102 rejections of claims 1, 6, 11 over Ito are withdrawn.

Response to Arguments

4. **Applicant's arguments filed with respect to the 35 USC § 102 rejections of claims 1, 6, 11 by Ito have been fully considered, and are persuasive.** Applicants contend that Ito does not teach the limitations added by amendment, namely the (now clearly claimed) recitation of multiple storage systems in a remote copy environment. In contrast, Ito while performing mirrored storage, is in a *shared* storage environment.

5. The examiner would also like to thank the Applicant for the courteous and helpful remarks presented in the interview of December 13, 2005, which were very helpful in clarifying the critical limitations of the invention.

6. Ito does not expressly disclose that the updated data received is from a different storage system. This is because the methods of Ito are in a shared storage environment where several file servers 100, 200, 300, Fig. 1 access shared storage

subsystems, rather than a system where each file server has its own storage subsystem.

7. Ito does disclose, however, that in the system of Ito multiple storage systems may exist. See Fig. 15, where storage systems 10 and 20 store identical data. See also Par. 17, and the discussion of Fig. 15 in Pars. 143,149, etc. However, the system of Ito does not teach or suggest that when data is updated in, for example, node 200 of Fig. 15, the filesystem metadata and write data is sent to the other node 300. Instead, Ito would seem to suggest that the write command (i.e., "*write(200,290,11)*" as shown in Fig. 15) is send to the other node and the remote filesystem handles it as if it had no knowledge of the node 200. Further, the message passing is handled by the file servers rather than the storage systems. Therefore, the rejection is withdrawn.

8. **However**, please see the new rejection below. These new rejections were necessitated by at least the amendments to the independent claims, which changes the scope of said claims. Therefore, this office action is made final.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. **Claims 1, 6, 11, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Srinivasan et al., US 6,823,336.**

10. **As for claim 1, Srinivasan teaches**

- A storage system comprising:
- a disk system having:
 - at least one disk to store data (26, 28, Fig. 1);
 - a disk control unit to control writing and reading of data to and from said at least one disk (25, 27, Fig. 1); and
 - a disk cache for transmitting and receiving data to and from said at least one disk (145-148, Fig. 9);
- a file server, connected to said disk system (i.e., 111, Fig. 8; 181, Fig. 13) including
 - a Central Processing Unit (CPU) and a main memory to store programs and data for said CPU (inherent in data mover 111, Fig. 8. see, for instance, Col. 5, lines 30-35, which incorporate by reference Ofek, US 5,893,140 as a description of the hardware in the system. Col. 4, lines 39-65 of Ofek, discusses a detailed view of the data mover, which Srinivasan shows as 111, Fig. 8),
 - a network interface to be coupled to clients through a network (Col. 17, lines 35-65);
- interfaces for sending and receiving data to and from other storage systems through a communication link (22, Fig. 1);

- wherein said main memory includes
 - a file system-processing unit managing storage areas of said at least one disk, so that files are correlated with data locations on said at least one disk (116-117, Fig. 9; see also 191-193, 201-203, Fig. 13), and
 - a file-system cache to be used by said file system-processing unit (see 194, 204, Fig. 13);
- wherein said disk control unit receives data of a file that has been updated in another storage system and a history of file-management information from another disk system through said communication link (see Figs. 10-11; the delta sets received are combinations of the data and metadata; Col. 11, lines 20-60) and stores the received data of a file and the history of file-management information on the disk system (141-142, Fig. 9), and
- wherein said file server refers to the history of the file-management information on the disk system and updates file-management information in said file-system cache in accordance with the update of the file performed in said another storage system (Col. 12, lines 1-35; both filesystems 116-117 are active, Col. 15, lines 38-40, 55-67; therefore, when the data updates in the caches 145-148 are applied to the disks 141-142, the other filesystem must be updated with the metadata from the caches).

11. **As for claim 16, Srinivasan further teaches:**

- when said disk-control unit receives a read request from a client coupled to the storage system, the storage system refers to the file-management information

updated in said file-system cache and reads from the disk, the contents of the updated file and transfers the contents to said client (see Col. 17, lines 13-24; also see read data, 143-134, Fig. 9).

12. **As for claim 6, Srinivasan teaches** a file reference method of a storage system, said storage system which includes:

- a disk system having:
 - at least one disk to store data (26, 28, Fig. 1);
 - a disk control unit to control writing and reading of data to and from said at least one disk (25, 27, Fig. 1); and
 - a disk cache for transmitting and receiving data to and from said at least one disk (145-148, Fig. 9);
- a file server, connected to said disk system (i.e., 111, Fig. 8; 181, Fig. 13) including
 - a Central Processing Unit (CPU) and a main memory to store programs and data for said CPU (inherent in data mover 111, Fig. 8. see, for instance, Col. 5, lines 30-35, which incorporate by reference Ofek, US 5,893,140 as a description of the hardware in the system. Col. 4, lines 39-65 of Ofek, discusses a detailed view of the data mover, which Srinivasan shows as 111, Fig. 8),
 - a network interface to be coupled to clients through a network (Col. 17, lines 35-65);

- interfaces for sending and receiving data to and from other storage systems through a communication link (22, Fig. 1);
- wherein said main memory includes
 - a file system-processing unit managing storage areas of said at least one disk, so that files are correlated with data locations on said at least one disk (116-117, Fig. 9; see also 191-193, 201-203, Fig. 13), and
 - a file-system cache to be used by said file system-processing unit (see 194, 204, Fig. 13);
- said file-reference method comprising;
 - a storing step in which said disk-control unit receives contents of a file that has been updated in another storage system (see “write data”, Fig. 9) and a history of file- management information through said communication link from said other storage system (22, Fig. 1) and stores the contents of a file and the history of file- management information on a disk (see Fig. 9; the secondary data storage system receives “delta chunks” which include both the data of the file changed in the other storage system and metadata for the filesystem update; Col. 11, lines 20-60; see also Col. 16, line 65 to Col. 17, line 3);
 - a monitoring step in which said file server refers to the history of the file- management information stored in said disk (see, for instance, Col. 15, lines 1-15; Col. 15, lines 42-57; some form of referrance is inherent in this update process, as the file system clearly uses the metadata received

from the other storage system to update the filesystem; therefore, it must refer to said metadata, which reads on the referring step);

- an updating step in which, based on a reference to the history of the file-management information, said file server updates the file-management information in said file-system cache in accordance with the update of the file in said other storage system (Col. 12, lines 1-35; both filesystems 116-117 are active, Col. 15, lines 38-40, 55-67; therefore, when the data updates in the caches 145-148 are applied to the disks 141-142, the other filesystem must be updated with the metadata from the caches; see also Col. 17, lines 1-3; the stored data is “replayed” to update the filesystem); and
- a transfer step in which, when said disk-control unit receives a read request from a client coupled to the storage system, the storage system refers to the file-management information updated in said file-system cache and reads from the disk, the contents of the updated file and transfers the contents to said client (see Col. 17, lines 13-24; also see read data, 143-134, Fig. 9).

13. **As for claim 11, Srinivasan teaches** a network system comprising

- a first storage system and a second storage system (110, 113, Fig. 9), wherein each storage system comprises:
 - a disk system having:
 - at least one disk to store data (26, 28, Fig. 1);
 - a disk control unit to control writing and reading of data to and from said at least one disk (25, 27, Fig. 1); and
 - a disk cache for transmitting and receiving data to and from said at least one disk (145-148, Fig. 9);
 - a file server, connected to said disk system (i.e., 111, Fig. 8; 181, Fig. 13) including
 - a Central Processing Unit (CPU) and a main memory to store programs and data for said CPU (inherent in data mover 111, Fig. 8. See, for instance, Col. 5, lines 30-35, which incorporate by reference Ofek, US 5,893,140 as a description of the hardware in the system. Col. 4, lines 39-65 of Ofek, discusses a detailed view of the data mover, which Srinivasan shows as 111, Fig. 8),
 - a network interface to be coupled to clients through a network (Col. 17, lines 35-65);
- interfaces for sending and receiving data to and from other storage systems through a communication link (22, Fig. 1);
- wherein each main memory of the first and second storage systems includes

- a file system-processing unit managing storage areas of said at least one disk, so that files are correlated with data locations on said at least one disk (116-117, Fig. 9; see also 191-193, 201-203, Fig. 13), and
 - a file-system cache to be used by said file system-processing unit (see 194, 204, Fig. 13);
- wherein the disk-control unit of said first storage system receives contents of a file that has been updated in the second storage system (see “write data”, Fig. 9) and a history of file- management information through said communication link (22, Fig. 1) and stores the contents of a file and the history of file- management information on a disk (see Fig. 9; the secondary data storage system receives “delta chunks” which include both the data of the file changed in the other storage system and metadata for the filesystem update; Col. 11, lines 20-60; see also Col. 16, line 65 to Col. 17, line 3);
- wherein the file server of said first storage system refers to the history of the file- management information on the disk (see, for instance, Col. 15, lines 1-15; Col. 15, lines 42-57; some form of referrance is inherent in this update process, as the file system clearly uses the metadata received from the other storage system to update the filesystem; therefore, it must refer to said metadata, which reads on the referring step) and updates the file- management information in the file- system cache of said first storage system in accordance with the update of the file in said second storage system (Col. 12, lines 1-35; both filesystems 116-117 are active, Col. 15, lines 38-40, 55-67; therefore, when the data updates in the

caches 145-148 are applied to the disks 141-142, the other filesystem must be updated with the metadata from the caches; see also Col. 17, lines 1-3; the stored data is "replayed" to update the filesystem); and

- wherein, when said first storage system receives a read request from a client, said first storage system refers to the file-management information updated in said file-system cache reads, from the disk, the contents of the update file received from said second storage system, and transfers the contents to said client (see Col. 17, lines 13-24; also see read data, 143-134, Fig. 9).

Allowable Subject Matter

Claims 2-5, 7-10, 12-15 are allowed. The reasons for allowance for these claims may be found in a prior action.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the attached PTO-892. **Yang, US 5,754,888**, teaches a storage system which uses a log disk to hold write data and metadata for storage in a disk system. **Ji et al., in "Seneca: remote mirroring done write"**, teaches a mirrored system which includes logs (i.e., write data and metadata caches) on both local and remote nodes, and the storage systems do the communication to maintain the mirror, rather than the host file servers. **Federwisch et al., US 2003/0182313 and Manley, US 2003/0182322**, both teach a mirrored storage system which contains local and remote storage systems as well as local and remote file servers, each containing a file system

Art Unit: 2187

accessible by clients, a write log, and a file system cache. **Patel, US 2003/0135514**, teaches a distributed file system which transmits file system metadata between the storage nodes.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

A handwritten signature in black ink, appearing to read 'Donald Sparks', is written over a horizontal line.

DONALD SPARKS
SUPERVISORY PATENT EXAMINER

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse Diller whose telephone number is (571) 272-4173. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



J.D.